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#4-167 Update status of the CABRI research reactor

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The CABRI experimental reactor, operated by CEA at the Cadarache research center, is a versatile facility, which can function at steady-state power (up to 25 MW), and allows the realization of energetic transients with a peak power up to 20 GW.

Our facility is involved in the realization of two important experimental programs. The first one concerns the safety studies of the PWR fuel and their cladding behaviour under Reactivity Initiated Accident (RIA) conditions in the frame of CABRI International Program (CIP), funded by IRSN (French Institute of Nuclear Safety and Radioprotection) under the auspices of the OECD/NEA. The CABRI International Program (CIP) tests submit irradiated UO₂ or MOx fuels to RIA in Pressurized Water Reactor thermal-hydraulic conditions, namely 280°C and 155 bar. The main objective of this program is to improve understanding of the thermomechanical behavior of such fuel under RIA transient, not only during the Pellet Clad Mechanical Interaction phase, but also for the entire duration of the boiling crisis triggered by the deposited in the test rod during the transient. Three CIP experiments have been realized between 2022 and 2024. On the other hand, for the needs of irradiation of inert components, we have extended the experimental capabilities of CABRI by two new irradiation positions within the pool, easily accessible from above the core and without interference with transient tests. These locations are located outside the core and behind the graphite reflector, with a useful space of 800 x 200 x 200 mm³. They allow the irradiation of various inert materials, to study their behaviour under neutron and gamma fields. A first experimental program, as part of a CEA's research program on inert materials has been carried out between 2022 and 2024, consisting in irradiations experiments on steady state and pulsed mode. At this stage, 14 irradiations have been carried out for this program.

This communication deals with the current abilities of the CABRI experimental reactor and highlights the specificities and the strengths of CABRI. We are also continuing additional feasibility studies to explore the options of extension of the experimental capacities of CABRI reactor for perspectives of realization beyond 2027.

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